



Machine design my gpa

StarTracker

03/12/2025

**Yuvraj Cheema, Samuel Sjoden, Connor Floyd, Taichi Kamei,
Ari Cholakian, Bram Banik, Austin Bai**

2025-2026

MECH 325

Table of Contents

I -	INTRODUCTION	3
II -	PURPOSE	4
III -	DETAILED ANALYSIS	5
	I - Bushing Selection and Design Rationale	5
IV -	RESULTS and FINAL DESIGN	6
V -	CONLUSIONS and RECOMENDATIONS	7
VI -	APPENDIX A	8
VII -	APPENDIX B	9

Chapter 1

INTRODUCTION

Chapter 2

PURPOSE

Chapter 3

DETAILED ANALYSIS

I - Bushing Selection and Design Rationale

I.I - Overview

To support both ends of the two shafts in the reduction stage, two sets of Dry-Running Nylon Sleeve bushings were chosen for their minimal wear properties, low cost, and light weight.

I.I.1 - Key Selection Requirements

- The bushings must have minimal wear to maintain the accuracy of the speed of the rotation
- The bushings must have minimal maintenance and lubrication requirements for the convenience of the hobbyists
- Minimize length to keep overall reduction stage small

Bushings were selected instead of bearings because of the small loads required, keeping costs low and occupying minimal space. In particular, dry bushings were selected to minimize maintenance on the StarTracker and eliminating lubrication requirements to make construction convenient for hobbyists.

To support the axial load of the worm gear, so a flanged bushing is used. The low speed of the shafts allow the shoulder of the shafts to directly transfer axial load into the bushing flange with minimal wear. Nylon is perfect for this because of its low friction and minimal wearing properties.

Price was also another important consideration, which the Nylon bushings meet, with a unit price of \$4.59.

In total this is why I selected Dry-Running Nylon Sleeve bushings.

Chapter 4

RESULTS and FINAL DESIGN

Chapter 5

CONLUSIONS and RECOMENDATIONS

Chapter 6

APPENDIX A

Chapter 7

APPENDIX B
